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Capital Flight from Ukraine: Measurement and Drivers

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Abstract

This thesis presents estimates of capital flight from Ukraine in the period 1994 to 2017. We use the World Bank Residual method to calculate capital flight as a residual difference between sources and uses of funds in the economy. Our findings show that pre-2014, capital flight amounted to 7.5 billion USD on average. On the contrary, in 2014 our method reports unrecorded capital inflow of 10.7 billion USD, which took place in times of economic recession and military conflict in the east of Ukraine. We analyze the factors that might have caused reverse capital flight, and consider that increase in remittance flows, growth of the black currency market and new niches in the underground economy might have had an effect on unrecorded capital inflows. Finally, we study the components of the World Bank Residual method, and suggest that capital flight might have taken forms that the method doesn't encompass. Therefore, we underline the importance of accounting for gaps in the method by adding trade misinvoicing estimates to capital flight volumes.

Keywords

Ukraine, Capital Flight, World Bank Residual Method, Balance of Payments, Shadow Economy

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Declaration of Authorship

1. The author hereby declares that he compiled this thesis independently, using only the listed resources and literature.

2. The author hereby declares that all the sources and literature used have been properly cited.

3. The author hereby declares that the thesis has not been used to obtain a different or the same degree.

Prague, 10th May 2019 Yuliia Marchenko

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Capital flight has been in the center of attention of researchers and policy makers for over two decades, especially in the area of development economics. Previous research estimates that total amount of illicit financial flows from developing countries amounts to 1 trillion USD (Kar and Spanjers, 2014). The goal of this thesis is to calculate volumes of capital flight from Ukraine in 1994-2017, and define main determinants of these flows. Ukraine is a post-transition economy, characterized by high levels of corruption, extensive shadow economy and political instability. In recent years, country experienced a major economic and political crisis, as military conflict in the east of Ukraine began in 2014. In this thesis, we want to investigate the impact of economic and political developments in the country on the dynamics of capital outflows from Ukraine. Previous research on the topic shows adverse impact of capital flight on poverty reduction efforts, economic growth, levels of domestic investment and income inequality in the country (Nkurunziza, 2014). Capital flight is particularly damaging in the situation when country borrows from abroad, since it diminishes funds available for debt service and diverts resources away from domestic investment (Ndikumana and Boyce, 2001).

Working hypotheses:

1. Ukraine experienced high levels of capital flight over the years.
2. Higher capital flight volumes occur in response to changes in macroeconomic and political situation in the country.
3. Capital flight intensified after the beginning of war in the east of Ukraine in 2014.
4. World Bank Residual method is able to capture the extent of unrecorded capital flows from Ukraine.

Methodology:

In this thesis, we will apply World Bank Residual method to calculate volumes of capital flight from Ukraine. This method estimates capital flight as a residual difference between sources and uses of funds in the economy. Sources of funds constitute increases in total external debt stock and inflows of foreign direct investment. Uses of funds represent foreign exchange used to cover deficit on the current account and increase foreign exchange reserves. Positive value of residual, defined as a difference between sources and uses of foreign exchange, indicates unrecorded capital flight, while negative value of the residual signifies capital inflow. World Bank Residual method uses data presented in Balance of Payments Statistics and data on external debt stock contained in International Debt Statistics assembled by the World Bank.

Outline:

1. Introduction.
2. Literature review: definitions, measurement methods and effects of capital flight.
3. Methodology: advantages of the preferred method; description of the variables; adjustments to the original method.
4. Results.
5. Discussion of results.
6. Conclusion and policy recommendations.

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Acronyms

BoP	Balance of Payments
CIF	Cost, Insurance and Freight
CIS	Commonwealth of Independent States
DOTS	Direction of Trade Statistics
EOM	Errors and omissions
FDI	Foreign direct investment
FOB	Free on Board
HMM	Hot Money Method
IDS	International Debt Statistics
TM	Trade Misinvoicing
WBR	World Bank Residual Method

1. Introduction

Capital flight has been in the center of attention of researchers and policy makers for over two decades, especially in the area of development economics. Capital formation serves as a basis of economic growth and development, whereas capital flight deprives a developing economy of these essential resources, impeding its poverty reduction efforts and leading to higher levels of foreign borrowing. It is not only official capital outflows but also unofficial, unrecorded and usually illicit capital flows that harm country's finances, growth and institutions. It is often difficult to determine whether capital flight is a cause or a symptom of the economic malaise, and it is a great challenge for a developing country to find and implement solutions to curb unofficial capital flows.

Not less challenging is to understand what capital flight actually is, and what makes it different from other types of capital outflows. This question is similar to the one asked by a Brazilian economist, Stephen Charles Kanitz, in an article in the Wall Street Journal (1984): *"Why is it that when an American puts money abroad it is called ''foreign investment'' and when an Argentinean does the same it is called ''capital flight''?"* Amidst the myriad of definitions, we find that capital flight can be used interchangeably with illicit financial flows (Kar and Cartwright-Smith, 2008), while at the same time a different group of authors argue that these two phenomena are distinct, and not all illicit flows constitute capital flight (Ndikumana et al., 2014). Others separate capital flight from total capital outflows based on the drivers (Sheets, 1995; Cuddington, 1986), such as macroeconomic risks, political instability and risks of expropriation. Another group of economists argue that significant capital outflows are damaging to a developing economy in general, and thus there is a need to get to the root of the phenomenon of capital flight as a whole without splitting it into categories (Eggerstedt et al., 1995; Hermes et al., 2002).

Then comes the choice of method to calculate the volume of these flows, which is usually conditioned upon the way capital flight is defined. Hot Money Method views capital flight as a response to the variety of domestic shocks, and

estimates capital flight volumes based on the value of changes in short-term foreign assets plus entries of net errors and omissions from the Balance of Payments statistics. Trade Misinvoicing method aims to capture the extent of manipulation of trade statistics that result in capital flight, and mirror statistics of the trading partners are used to estimate these flows. World Bank Residual method calculates capital flight as a difference between sources and uses of funds as per official statistics, and thus it is believed to capture all unrecorded capital outflows. Aforementioned methods have been widely used in the literature. Studies by Global Financial Integrity (2008, 2014, 2017), Ndikumana et al. (2001, 2010, 2014, 2018) and Cuddington (1986, 1987) use one of the methods or the combination of the three, to estimate capital flight volumes. Results presented in these studies show that capital flight is a persistent feature of many developing economies, and magnitude of these flows sometimes exceed the volumes of foreign borrowing and financial aid provided to these countries.

In this thesis, our goal is to estimate volumes of capital flight from Ukraine in the period from 1994-2017 and identify factors affecting the dynamics of these flows. Previous research (Brada et. al., 2011; Kar and Cartwright-Smith, 2008) estimated between 4.1 and 8.5 billion USD of yearly capital flight over 1995-2006. In this paper, we extend these calculations over a longer time period – from 1994 till 2017 - to capture the important changes in capital flows that occurred in response to the beginning of war in the east of Ukraine in 2014 and other major economic and political developments in the country. Therefore, we will be making our contribution to the study of capital flight by estimating volumes of unrecorded capital flows in a one-country study over the time period characterized by political instability and deterioration of macroeconomic indicators.

In order to calculate volumes of capital flight, we use World Bank Residual method, which relies on Balance of Payments statistics as well as data on external debt contained in International Debt Statistics of the World Bank. This method calculates capital flight as a residual difference between sources and uses of funds in the economy. Positive difference indicates unrecorded capital flight, while negative difference signifies capital inflow.

In this thesis we are going to answer the following research questions. First, is capital flight a permanent phenomenon in Ukraine's economy? Second, do periods of higher capital flight coincide with adverse developments in country's economic and political spheres? Third, did volumes of capital flight increase drastically in response to heightened economic and political instability in 2014-2015? Finally, we want to answer the question of the efficacy of the World Bank Residual method in a one-country study, and in particular, in periods of significant changes in country's Balance of Payments statistics resulting from economic recession and political crisis.

Our main results go as follows. In 1994-2013, capital flight amounted to 7.5 billion USD on average, with highest capital flight recorded in 2007 in the value of 21 billion USD. Starting in 2014, somewhat surprisingly we observe capital inflow in the amount of 10.7 billion USD, which continued over 2015-2017 with 3.9 billion USD on average in unrecorded capital inflows. We put forward several hypotheses and consider a range of factors, which might have caused inflows of unrecorded capital in this time period. The latter include increase in remittance volumes, higher demand for foreign currency on the black market and the impact of country's large underground economy. We also consider that both gaps in the World Bank Residual method and issues with the Balance of Payments statistics can partially explain why capital inflow is reported in times, when a spike in capital flight is expected.

This thesis is structured as follows. In the second section, we analyze potential determinants of capital flight from Ukraine, and provide with a brief overview of country's economic and political developments over the studied period. The following section contains the literature review on capital flight, including variety of definitions and related measurement methods. In the fourth part of this paper, we present detailed methodology underlining the World Bank Residual method used in estimating capital flight from Ukraine, and introduce adjustments made to the original version of the method. Next, we present the estimated volumes of capital flight from Ukraine in 1994-2017, and provide comparison of our results with overlapping periods of study from previous available research. A subsequent section is devoted to the discussion of results

produced by the World Bank Residual method, where we put forward several hypotheses to explain the nature of reverse capital flight we observe in 2014-2017. Finally, in the last section we provide the summary of our findings and discuss possible improvements to the methodology used to estimate capital flight.

2. Characteristics of Ukrainian Economy

Research shows that while significant levels of capital flight occurred in most transition economies post 1989 in response to unfavorable economic conditions and political instability, successful completion and implementation of post-transition reforms lead to a sharp decline of volumes of capital flight, and in some countries prompted capital repatriation in early 90s (Sheets, 1995, p.24-27). This was not the case for Ukraine and some other CIS economies, where turbulent transition process led to drop in levels of investment over the first 15 years after the transition combined with decline in output and income levels (Brada et al., 2011, p.718). In Ukraine, some of the necessary post-transition reforms haven't been completed till today, and the GDP in 2017 reached only 67% of the 1991 level[1]. Compared to other post-communist countries, levels of GDP in PPP per capita Ukraine are considerably lower: in 2017, Ukraine was on 148^{h} place in the global ranking with 8754 USD per capita, whereas Russia, Kazakhstan and Belarus are on 73rd, 78th and 96th places respectively[2]. Since 1991, levels of foreign direct investment in Ukraine were the lowest in the whole of Eastern and Central Europe (Dean, 2000, p. 94)

As for many other transition economies, capital flight in Ukraine was fueled by economic mismanagement and political instability of the early years of transition process. At the same time, as Sheets (1995, p.7) points out, at the beginning of the transition, portfolio diversification motive was strong, since prior to 1991 agents were holding domestic assets only and communist authorities had a complete control over foreign exchange transactions. As these first years of transition established an infrastructure for capital flight, it is possible that these channels were preserved even as economies started to recover (Brada et al., 2011, p.731). This is in line with the "habit forming" nature of capital flight, described

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1 World Bank. *GDP, PPP, constant 2011 international $.* [online] Available at: <https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.KD?locations=UA> [Accessed 9 May 2019]

2 CIA World Factbook. *GDP - per capita, PPP*. [online] Available at: <https://www.cia.gov /library/publications/the-world-factbook/fields/211rank.html> [Accessed 9 May 2019]

by Ndikumana and Boyce (2003, p.109). In the following years, trade liberalization and market reforms made it easier and cheaper to move assets abroad while capital inflows weren't sufficient to offset the volumes of capital flight, especially in the presence of macroeconomic and political instability (Sheets, 1995, p.27). As research shows (Brada et al., 2011), capital flight in CIS economies remained at high levels long after 1991, which indicates that much of post-transition distortions weren't tackled successfully decades after the transition began.

Determinants of capital flight in transition economies are related to a number of distortions created by macroeconomic instabilities and fragility of countries' institutions. Below we list drivers of capital flight from Ukraine, which in our opinion played an important role in dynamics of capital flows over the studied period.

Monetary Policy. Rapid money growth and weakness of domestic currency are considered to be the important drivers of capital flight (Sheets, 1995, p. 9). In Ukraine, in 1993 inflation exceeded 10000%, and after a short period of stabilization, hyperinflation resumed, bringing a sharp drop in the value of national currency and contributing to a major financial crisis in 1998-1999. In the 90s, National Bank of Ukraine helped finance budget deficit first by means of seigniorage, and from 1996 by issuing government bonds (Hrubliak, 2011, p.62). These actions of Bank resulted in hyperinflation, and as people started buying dollars as a store of value, Ukrainian Hryvnia continued to depreciate even further (Petryk, 2006, p.8). Generous rate of return on government bonds of as much as 140% of average annual yield in 1995 and 82,5% in 1996 was a reflection of high investment risks, and as effects of Asian financial crisis started to reach Ukraine, crash on the T-bills market was inevitable (Hrubliak, 2011, p.63). This financial crisis came at a high cost to Ukraine's economy: national currency devaluated by 60%, inflation rose by 20% and foreign reserves decreased significantly (Petryk, 2006, p.10-11). Previous estimates show that in 1998, capital flight from Ukraine spiked by nearly 3 billion USD (Brada et al., 2011, p. 728).

Macroeconomic Instability. After a period of recovery in early 2000s, where economic growth was accelerated by increased competitiveness of Ukraine's exports and growing consumers' demand, political instability and slow pace of systemic reforms continued to hamper Ukraine's economic development (Petryk, 2006, p.12-15). More importantly, Ukraine was growing more and more reliable on external borrowing to pay for growing share of imports. When the world financial crisis hit Ukraine, country's external debt stock stood at 91.5% of GDP and 191.6% of annual exports, as economy contracted and Hryvnia continued to depreciate (Sutela, 2012). Annexation of Crimea and beginning of military conflict in 2014 led to another economic crisis, with an unprecedented fall in investment levels by 3.7 billion USD and major currency depreciation, when Ukrainian Hryvnia lost 47% of its value in 2014 and depreciated by further 33% in 2015 (World Bank, 2017, p.4).

Property Rights. Another group of capital flight determinants is related to country-specific risks. In transition economies, risk of expropriation continues to be an important driver of capital flight (Brada et al., 2011, p.720). After 1991, in Ukraine privatization was recognized to be the first step in the process of transition to the market economy. However, lack of transparency and political interference in the privatization process hindered achievement of the overall goal, which was improved efficiency of newly created enterprises. Moreover, consecutive governments were attempting to review privatization conducted by their predecessors, which created uncertainty of property rights in Ukraine (Ferdinand and Onischenko, 2005). High levels of bribery and corruption as well as influence of power interests in acquiring wealth further undermined protection of private property (Sutela, 2012). Moreover, even though Ukraine adopted legislation that protects rights of investors, it lacked sufficient court practice of cases based on expropriation norms (Pojedynok, 2015). One of the ways to account for risks associated with property rights is for an investor to move capital abroad and then reinvest it in the domestic economy, under the assumption that foreign capital is less likely to be expropriated by the government (Brada et al., 2011, p.721). This is consistent with data on investment flows to Ukraine, which

shows that Cyprus has a largest share of FDI to the country, whereas experts suggest that this capital is subject to "round-tripping", i.e. domestic capital is shifted abroad for it to be reinvested domestically in form of a foreign direct investment (Saha, Kravchuk, Kirchner, 2018).

Political Risks. Political risks are related to uncertainty regarding future government policies and lack of credibility of government's commitment to reform. In the statistics of crony capitalism index by The Economist (2016), Ukraine is on the 5th place. Oligarch clans started to form in the early years of transition, where political connections and chaos of the post-command economy created space for some individuals to seek high rents and start exerting pressure on political processes (Dean, 2000, p.104-105). As a result, business and the state became closely intertwined, where property rights protection was offered to a certain group of asset holders favored among others. In exchange, political leaders could partake in dividing rents generated by protected asset holders (Haber, 2002, p.13-15). Political risks also manifest in widespread corruption, which has been quoted as top business obstacle in most international rankings and surveys of private sector companies in Ukraine. In BEEPS V survey, respondents reported to pay over 14% of the contact value in informal payments to secure government contracts, and almost 100% of the firms declared to have made this payments (OECD, 2015). In most recent survey conducted by Dragon Capital, the European Business Association (EBA) and Centre for Economic Strategy (CES) in August-September 2018, corruption and lack of trust in judiciary was the biggest obstacle for doing business three years in a row (European Business Association, 2018).

Tax Disincentives and Excessive Bureaucracy. In Ukraine, complexity of tax administration and frequent changes of legislation are listed among key factors negatively affecting business development (Cheney, Zolotarev, Wyne, 2017, p.18). In the past, Ukrainian businesses had to pay 135 different types of taxes, while excessive bureaucracy and inefficient administration of taxes created extra operational costs for businesses (World Bank, 2011, p.42). Since 2014, Ukrainian government implemented a range of reforms to improve transparency and

administration of taxes. However, as economists rightly point out (Moldovan, 2011), even under complete absence of official taxes, if local mafia leaders continue charging businesses unofficial taxes at arbitrary levels, Ukraine's economy has little chances to develop into successful market economy.

Military Conflict. Ongoing military conflict in the east of Ukraine has a detrimental impact on investment climate in the country. In 2014, foreign direct investment inflows to Ukraine decreased by 3.7 billion USD, and continue to remain at low levels. At the same time, foreign investment was scarce even before the conflict: pre-2014 most of the FDI was originating in tax havens, where the ownership of the foreign companies could be linked to Ukrainian enterprises (Saha, Kravchuk, Kirchner, 2018). The fact that very few foreigners were investing in Ukraine even before the military conflict is the evidence of poor investment climate, which characterized Ukraine since 1991.

Today Ukraine has a challenging mission to integrate into global economy while the process of systemic, socio-economic and political transformation hasn't been concluded (Radchenko and Shavaluk, 2017, p.148). Capital flight is one of the symptoms of country's many problems, while so-called "human capital flight" levels continue to grow, as more and more Ukrainians leave their country in search of better life prospects.

3. Literature Review

3.1. Defining Capital Flight

In the literature on capital flight, we find that economists tend to disagree on which flows constitute capital flight, and whether the nature of this phenomenon as a whole is legal, illegal or both. In this section we review capital flight definitions and analyze their components.

The first group of definitions aims to distinguish legal capital outflows from illegal capital flight. For instance, Kar and Cartwright-Smith (2008) in their research of illicit financial flows from developing countries explain that while legal capital flight is recorded in Balance of Payments statistics, this data does not account for the part of capital outflows that were illicit and thus weren't recorded. Illegality stems from the way the profits were earned or utilized (e.g. corruption) and/or the way they were transferred abroad (e.g. in breach of custom regulations, tax laws and other) (Ibid, p.1). Therefore, authors define all capital flows that are not recorded in the official statistics as illicit financial flows. On the contrary, Ndikumana et al. (2014, p. 13) emphasize that capital flight and illicit financial flows are two distinct concepts since they are driven by different factors. Authors argue that illicit financial flows include more than what is captured by capital flight (e.g. payments for smuggled imports and profits resulting from transfer pricing), and therefore these two terms should not be used interchangeably.

Regarding the separation of licit and illicit capital flight, there are two important questions to consider: whether this distinction is possible, and whether it is necessary. Eggerstedt at al. (1995, p. 212) emphasizes on the difficulty to isolate "normal" capital flows from the total flows, and claims that even defining "normal capital flows" is a challenging task, since the decision of what should be considered a "normal" transaction or outflow might appear to be arbitrary. At the same time Hermes et al. (2002, p. 2) claim that all types of capital outflows can be damaging to a developing economy: *"It is argued that for countries struggling with (large) current account deficits and external debt payments—and which are*

thus in need of foreign capital—any capital outflow increases the problems of financing their net imports and debt payments". Therefore, they refrain from separating legal and illegal component of capital flight and instead concentrate on calculating the total amount of unrecorded capital flows from a country.

Another group of definitions stresses the importance of the factors that drive capital flight rather than its nature. Sheets (1995, p.3) in his model of demand for domestic risky assets, defines capital flight as *"a subset of capital outflows that is due to excessive macroeconomic risk or structural distortions, such as financial sector repression, distortionary taxation, and poorly enforced property rights".* Cuddington (1986, p. 2) claims that capital flight constitutes *"short term speculative capital outflows",* which take place in response to changes in macroeconomic and financial conditions in the economy – so-called "hot money" - on the contrary to gross capital outflows which combine all other methods of capital export. Similarly, Schneider (2003) defines capital flight as the outflow of resident capital from a country in response to economic and political risks in the domestic economy.

In this thesis, we define capital flight as **net unrecorded capital outflows**. These flows do not enter the official statistics (i.e. Balance of Payments), and thus they are made to be hidden from the eyes of authorities and taxpayers. We consider these flows to represent capital flight that goes beyond portfolio diversification motives, and is likely to be a result of political and economic environment of a country, expressed in low levels of economic growth, deterioration of macroeconomic indicators, political instability and poorly enforced property rights.

3.2. Drivers of Capital Flight

Economic theory suggests that capital outflows usually occur in response to interest rate differential between home and abroad. Investors choose to secure their portfolios by allocating funds in imperfectly correlated assets. Investing into both foreign and domestic assets protects investor from incurring losses caused by adverse and unpredicted developments in the domestic economy. Therefore, capital flows motivated by portfolio diversification incentive have a goal of

ensuring that portfolio generates highest possible profit, while the risks of losses are minimized. These capital flows are reflected in the Balance of Payments statistics, and are often described as "normal" flows that are not included in capital flight.

Sheets (1995) in his study of capital flight from economies in transition, adds a consideration of risks and returns to portfolio diversification incentive. Author argues that investors' decisions aren't driven by portfolio diversification motives only, since risk differentials play an important factor in invertor's demand. Relative riskiness of the home asset might be inflated due to the presence of structural distortions and macroeconomic risks in the domestic economy. At the same time, relative returns depend on country's monetary policy and soundness of the financial sector, which might affect the link between high marginal product of capital and returns on domestic assets. Therefore, Sheets (1995, p.6) concludes that relative returns and relative risks play an important role in investor's decision to allocate his funds between domestic and foreign assets.

In line with the theory described above, Khan al Ul Haque (1985) argue that due to higher risks associated with investing domestically, agents decide to shift their savings abroad and use increases in foreign borrowing to finance domestic investment. In their research, authors observed that higher volumes of capital flight coincided with increases in the foreign debt. Their findings were backed with results produced in a number of other studies (Boyce, 1992; Ndikumana and Boyce 2003; Brada et al., 2013).

Another group of economists focuses on the impact of country-specific factors, such as those related to the transparency of country's institutions, political stability and economic policies. As Cuddington (1986, p. 11) states: *"Capital flight is a direct private-sector response to ill-conceived or poorly executed domestic policies"*. Political instability, frequent changes in state legislation and taxation policy as well as poorly enforced property rights bring large level of uncertainty over profitability and security of domestic investments. Consequently, both foreign and domestic investors might choose to put their money to work elsewhere (Sheets, 1995, p.10). On the example of poorest African economies, Boyce and Ndikumana (2001) show that capital flight is both a cause and a

symptom of low levels of investment: unstable macroeconomic and political conditions incentivize capital flight, but also significant capital outflows enhance poverty of domestic public finances and decrease the pool of available investment, and thus deprive the country of the recourses it needs to improve the domestic conditions in an attempt to prevent further capital outflows.

Finally, weakness of country's political institutions gives way to high levels of corruption and other criminal activities. Capital flight in this case serves the purpose of hiding the origin of illegally earned money (Brada et al, 2011, p.721). This situation inflicts a double harm to the domestic economy: first, illegal activities that generate these incomes have a negative impact on society and undermine the effectiveness of political and law-enforcement institutions. Second, perpetrators shift the income resulting from these activities outside of the country's borders, often avoiding any capital or currency controls (Ibid). It is worth stressing that capital losses resulting from illegal activities such as corruption do not necessarily leave the geographical borders of the country – assets acquired by means of corruption are simply taken out of the pool of funds available for investment and added to the stock of money available for private consumption of individuals engaged in corruption schemes (Lanovyi, 2016). These activities, though damaging to the national economy, do not constitute capital flight.

3.3. Effects of Capital Flight

Capital flight is particularly damaging to developing economies, which struggle with heavy debt burdens and are often dependent on foreign aid. Ndikumana and Boyce (2001) estimated volumes of capital flight from severely indebted counties in Africa, and their results show that the magnitude of capital flight exceeds the value of total external debt, making Africa a net creditor to the world. Kar and Spanjers (2014) reach similar conclusion in the study of a sample of developing countries, and show that volumes of foreign direct investment and official development aid combined are lower than aggregate volumes of illicit financial flows from these countries. It is not a coincidence that the most heavily indebted countries tend to experience large volumes of capital flight –

phenomenon of debt-fueled capital flight has been described in the literature (Khan and Ul Haque, 1985; Boyce, 1992). At the same time, debt repayment flows diverge recourses away from investment, especially into sectors that have a direct effect on the welfare of the society such as medical care system, education and infrastructure (Nkurunziza, 2014, p.8). Capital flight contributes to increasing inequality, as capital flight investors benefit on the profits acquired from shifting their legally and illegally earned incomes abroad. At the same time, other part of the society is disproportionately worse off, as increasing capital flight harms domestic economy through further deterioration of investment climate and worsening of overall macroeconomic conditions (Sheets, 1995, p.13).

3.4. Measuring Capital Flight

It has been observed in the literature that the choice of method to measure capital flight highly depends on how capital flight is defined. In particular, it is important whether the definition has a goal of separating licit and illicit components of capital flight, or in other words, distinguishing between "normal" capital outflows (such as for purposes of portfolio diversification) and "abnormal" (illicit) capital flight.

Methods designed to measure capital flight rely on Balance of Payments statistics to a different extent. Balance of Payments statistics (BoP) record inward and outward financial flows, which result from economic exchanges between countries (Ndikumana et al., 2014, p.3). Specifically, BoP captures all current account transactions and capital and financial account transactions. The former reflect trade in goods and services as well as current transfers (such as remittances). In capital and financial account transactions, the key components are debt flows and private investment flows, while "Reserve assets" section reflects changes in country's foreign exchange reserves (International Monetary Fund, p.41-48). If all inward and outward transactions were adequately recorded, current account balance would be equal to the balance on capital and financial account, so that all sources of funds (i.e. foreign exchange in the economy) match the uses of funds (Ndikumana et al., 2014, p.5). In practice, however, due to statistical errors and other reasons, including capital flight, there are discrepancies between two

accounts, which are reflected in net errors and omissions (EOM) section of the BoP. If these discrepancies were result of purely statistical errors, then net EOM would be relatively small (Ibid.).

Below most widely used methods to measure capital flight are discussed: Hot Money Method (HMM), World Bank Residual Method (WBR, or residual method) and Trade Misinvoicing Method (TM).

Hot Money Method. This method uses direct approach to measure capital flight, i.e. it is relying directly on data reported in the Balance of Payments. HMM suggests that capital flight is captured in net errors and omissions section of the BoP, while large and negative net EOM indicate capital flight (Kar and Cartwright-Smith, 2008, p.2). One modification of HMM (Hot Money 3) also includes a subset of short-term capital transactions carried out by the private sector, which are considered to reflect speculative capital exports in response to rising political and economic risks, currency devaluations, etc. These short-term capital flows in combination with net EOM value from BoP statistics provide estimation of capital flight (see Cuddington, 1986, 1987). Therefore, HMM relies on official and recorded Balance of Payments data to calculate capital flight. This is on the contrary to the residual method, which captures unrecorded capital flows that aren't reflected in the official statistics. Cuddington (1986) argues that HMM unlike World Bank Residual method allows for distinction between capital outflows for the purpose of portfolio diversification and other capital flows: long term outflows will be those made with the motive of portfolio diversification, while short term capital flows correspond to capital flight.

World Bank Residual Method. In view of this method, capital flight, and particularly its illicit component, is intended to be hidden and unobservable – that is not recorded in any official statistics. Therefore, indirect estimation methods have been developed to capture the magnitude of unrecorded capital flows. The most widely used indirect method to calculate capital flight is the World Bank Residual method (WBR), or residual method, which estimates capital flight as the difference between sources and uses of funds in the economy. Sources of funds

are considered to be an inflow of foreign exchange, which comprise change in the stock of external debt and the net inflows of foreign direct investment (FDI). Uses of funds are uses of foreign exchange within an economy reported in official statistics, such as covering current account deficit and increasing foreign exchange reserves (Ndikumana et al, 2014, p. 6). Capital flight is defined as the situation, when sources of funds exceed their uses, i.e. when certain amount of foreign exchange entering the economy does not have a corresponding recorded purpose of its use within the country as per official statistics. As Ndikumana et al. (2014, p.3-4) point out, if BoP statistics were the only source of data used, then capital flight calculated with this method would correspond to the value of net errors and omissions reported in Balance of Payments. However, researchers noticed significant discrepancies between debt flows recorded in BoP statistics and actual indebtment levels. Therefore, International Debt Statistics assembled by the World Bank by using market sources and making its own estimates are taken as a source for country's stock of external debt. According to WBR method, capital flight is expressed in all domestic accumulation of foreign assets (except official reserves), and it accounts for both short-term and long-term capital flows (Sheets, 1995, p. 17-18).

Trade Misinvoicing. It is important to note that neither of the methods described above accounts for trade misinvoicing – a technique used to shift funds abroad and hide them from being captured by official trade statistics. Trade misinvoicing occurs on both export and import side. Trade misinvoicing of exports takes place when exporters understate their revenues on a customs invoice with the goal of retaining uninvoiced part of exports abroad. On the import side, overinvoicing allows to obtain extra foreign currency from the banks in order to retain the difference between invoiced and real volume of imports abroad (Boyce and Ndikumana, 2001, p.32). Thus discrepancy between true and faked quantity of the goods is not recorded in the statistics of either of the trading partners and consequently, it cannot be calculated directly from BoP data. In the view of WBR method, if trade misinvoicing occurs, current account deficit won't reflect the actual flows of goods (Eggerstedt et al., 1995, p. 215). At the same time, it has

been claimed that trade misinvoicing is also an important mechanism responsible for significant volumes capital flight, particularly in developing economies, as recent studies show (Ndikumana et al., 2014; Baker et al., 2014; Ndikumana and Boyce, 1998, 2001; Global Financial Integrity, 2008, 2014, 2017).

In order to calculate trade misinvoicing, mirror trade statistics approach is used. The latter consists of comparing amount of imports and exports declared by the country with amounts reported by its trading partners based on the IMF data on international trade published in Direction of Trade Statistics (DOTS). There is however several critical issues with this approach, which might lead to unreliability of the results it produces.

First assumption that must be applied in order to be able to compare reported exports with reported imports concerns the CIF/FOB factor. This is because IMF Direction of Trade Statistics (DOTS) shows export on FOB (free on board) basis and import on CIF (cost of freight and insurance) basis. Therefore "mirror" comparison of trade volumes can't be completed without adjustment of imports for costs of freight and insurance. Given that that few countries report CIF/FOB factor, and that it differs for every country and every product type, researchers introduce a generalized assumption of the value of CIF/FOB factor value to estimate trade misinvoicing. In the latest report on illicit financial flows from developing countries (Global Financial Integrity, 2017), the value of CIF/FOB factor difference is set at 10%, and until recently the same value has been used by the IMF (IMF DOTS, 2018, p. 11). Recently, this assumption was changed to 6% of the CIF value. The latter estimate was based on data reflected in the OECD International Transport and Insurance Cost (ITIC) database (Marini, Dippelsman, Stanger, 2018). Moreover, in 2017, OECD published detailed data on transport and insurance costs for more than 180 countries for over 1000 products (Miao and Fortainer, 2017). Therefore, mirror statistic would be estimated more accurately if one would account for the CIF/FOB time-varying country-specific margins for each country and each product type. In the future, IMF DOTS statistics plan to include OECD-estimated time varying and country specific values of CIF and FOB instead of flat 6% margin which is currently used (Marini, Dippelsman, Stanger, 2018).

At the same time, CIF/FOB factors are one of the many reasons why discrepancies between mirror exports and import statistics exist. According to IMF, other reasons include differences in classification, time of recording, volatility of exchange rates of currencies used in trade transactions, shipment and re-export through intermediate points, coverage, and processing errors (IMF DOTS, 2018, p.6). Moreover, as mentioned earlier, some countries do not report their trading statistics consistently, and even when data is available, it is not spread around all types of products traded (Global Financial Integrity, 2017, p.15). In addition, trade misinvoicing estimates are limited to merchandise trade only, since data on trade in services and intangibles is excluded (Global Financial Integrity, 2017, p. 2).

Certainly, trade misinvoicing is also one of the reasons why reported exports do not match reported imports of a partner country, and it has been shown that falsification of trade documents has been an effective tool of funneling capital abroad (Ndikumana et al., 2014; Baker et al., 2014; Ndikumana and Boyce, 1998, 2001; Global Financial Integrity, 2008, 2014, 2017). However, separating how much of discrepancy in mirror statistics is caused by trade misinvoicing and how much by other factors listed above is not possible without a number of assumptions. As pointed out in the latest report of the Global Financial Integrity (2017, p. 2), in addition to data inaccuracy caused by differences in classification and recordings, there are other transactions used in international trade for the purposes of capital flight, which are not registered directly and therefore aren't possible to account for – these include cash transactions, some of the invoice faking and hawala transactions. And again, even when data is available, it is often imprecisely measured. As Nitsch (2016, p. 254-261) points out, while there is no tool to measure trade misinvoicing given data issues, it is also questionable what part of it constitutes capital flight. Similarly to transfer pricing, trade misinvoicing is often used for the purposes of tax avoidance, among other reasons – such as avoiding trade restrictions, trying to benefit from export subsidies etc., which do not fall within the capital flight definition outlined earlier in this thesis.

In Ukraine, applying mirror trade statistics method would be particularly problematic, since most of the trade is done through intermediary importer

countries – often tax havens. Research of economic consequences of Ukraine's offshore trade conducted by Neboha (2015) and based on the official data of the State Statistics Service, shows that in 2014, 86% of Ukrainian exports were passing though countries that were consuming only 26% of Ukrainian produce. Five of them had an income tax more than 5 percentage points lower than in Ukraine, and the price of the exported produce to these countries was 20-90% lower than the actual market price. The price of goods sold to the final importer country was much higher, and the difference between price paid by intermediate importer and final consumer stayed in the tax haven. When price manipulation takes place in trading between subsidiaries of one company, this phenomenon is described as transfer pricing - technique often used by multinationals. Trade mispricing entails partners recording the same price on both sides of the transaction, however that price is often anomalous, i.e. very different from the market price of the traded good. Ndikumana et al. (2014, p.10) call transfer pricing a "first cousin" of capital flight, but a distinct phenomenon in itself due to the fact that it is driven by different determinants, as the main motivation for transfer pricing is tax avoidance, while motives that drive capital flight are more complex. Moreover, since in case of transfer pricing both partners report same quantities and prices, mirror statistics cannot be applied to detect volumes of capital taken out of the countries as the result of price manipulation in international trade transactions.

Therefore, while we are aware that part of the funds lost through trade mispricing might constitute capital flight, we also agree with the critics of this approach, who point our at fragility of the underlining assumptions as well as impossibility to control for statistical errors. Because of that, we do not undertake the estimation of trade misinvoicing in this paper.

4. Methodology and Data

In this thesis, we use the World Bank Residual method to calculate volumes of capital flight from Ukraine. This method has been widely used in the literature on capital flight (Ndikumana et al (2014), Ndikumana and Boyce (2000, 2010), Schneider (2003), Hermes and Lesnik (2001) among others). At the same time, we find this method to be better suited to measure capital flight from Ukraine than Hot Money Method. First of all, HMM excludes long-term flows form capital flight calculations. In view of HMM, the latter represent legal capital flows made with a purpose of portfolio diversification, while short-term flows are considered to reflect capital exports in response to rising risks associated with investing domestically. However, as Sheets (1995, p.15-16) underlines, if political and/or macroeconomic disruptions are permanently present in the domestic economy, investors will take long-term positions in the foreign country instead of short-term investment. Given that Ukraine's economy is characterized by permanent presence of domestic shocks and instability, we believe that excluding long-term flows might significantly understate total volumes of capital flight. In addition, as Kar and Cartwright-Smith (2008, p.2) note, many developing countries do not report private short-term flows, and thus the magnitude of these flows can also be understated. Lastly, while HMM considers large and negative net errors and omissions in the Balance of Payments to indicate capital flight, this number can be inflated by the fact of poor recording of the external accounts by some developing economies (Kar and Cartwright-Smith, 2008, p.2-3).

Capital flight from Ukraine has been previously studied as a part of a wider sample of economies. Research of Global Financial Integrity over the years estimated capital flight from developing countries, including Ukraine. In the report published in 2008 (Kar and Cartwright-Smith), authors combined World Bank Residual method and Trade Misinvoicing method to calculate volumes of capital flight - or illicit financial flows as authors define it. The results show an average of 8.5 billion USD of illicit financial flows from Ukraine between 2002 and 2006 captured by WBR method. As for Trade Misinvoicing, authors reported

only 28 million USD captured by this method in 2006, while for all other years the estimated value of capital flight through trade misinvoicing practices was equal to zero. Another study of capital flight from Ukraine was conducted by Brada et al. (2011), who estimated capital flight with the World Bank Residual method for a sample of 7 CIS economies over 1995-2005. Their findings show consistently high levels of capital flight from 4 out of 7 CIS economies, including Ukraine with capital flight amounting to 4.2 billion USD on average over the years.

World Bank Residual method relies on data presented in the Balance of Payment statistics and World Bank data on external debt (International Debt Statistics). Capital flight is estimated as a residual difference between sources and uses of foreign exchange in the economy. Sources of foreign exchange are changes in the value of countries' total external debt and net inflow of foreign direct investment. It is assumed that there are two main uses of foreign exchange within the domestic economy: to cover current account deficit and increase holdings of foreign exchange reserves. Positive difference between sources and uses of funds indicates unrecorded capital flight, while negative difference signalizes capital inflow. It is important to underline that the residual method does not differentiate between "normal" and "abnormal" capital flows – residual difference between sources and uses of funds is a measure of all unrecorded private capital flows (Hermes et al., 2002, p.3).

Formula of the World Bank Residual measure of capital flight goes as follows:

$$KF_t = (\Delta DEBT_t + FDI_t) - (CA_t + \Delta RES_t)$$

where $(\Delta DEBT_t + FDI_t)$ are sources of foreign exchange and $(CA_t + \Delta RES_t)$ - uses of foreign exchange.

As mentioned earlier, data on external debt come from International Debt Statistics assembled by the World Bank[3], while data on net FDI, current account

[3] World Bank. *International Debt Statistics* [online] Available at: <https://datacatalog.worldbank.org/dataset/international-debt-statistics> [Accessed 10 May 2019]

deficit and change in reserves and related are the data from the Balance of Payments, which we sourced from the World Bank open data.

4.1. Description of the Variables

Change in total external debt stocks ($\Delta DEBT_t$). In line with definitions coined by the World Bank (International Debt Statistics, 2016, p.164), total external debt is the sum of long-term external debt, short-term debt, and IMF credit. Long-term debt comprises private nonguaranteed debt (PNG) as well as public and publicly guaranteed debt (PPG). Change in total external debt stocks is a source of funds in view of the method.

Net inflow of foreign direct investment (FDI_t)[4]. The latest IMF guidance for compilation of FDI statistics (International Monetary Fund, 2014) sets out the rules for recording investment flows in Balance of Payments statistics. According to Balance of Payments and International Investment Position Manual (6th edition), direct investment has to be represented according to asset/liability principle, while net FDI is calculated as a change in assets minus change in liabilities. Net FDI constitutes sources of funds as per residual method.

Current account deficit - CA_t[5]. According to IMF definition, current account shows flows of goods and services as well as primary and secondary income flows between residents and nonresidents (International Monetary Fund, 2016, p. 9). Current account deficit can be understood as either the situation when the value of imports exceeds the exports, or when level of domestic savings is falling short of investments. This variable represents "uses of funds" as per WBR method.

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4 World Bank. *Foreign direct investment, net inflows (BoP, current US$)* [online] Available at: <https://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD?locations=UA> [Accessed 10 May 2019]

5 World Bank. *Current account balance (BoP, current US$)* [online] Available at: <https://data.worldbank.org/indicator/BN.CAB.XOKA.CD?locations=UA> [Accessed 10 May 2019]

Change in reserves and related items - ΔRES_t[6]**.** Defined as external assets readily available to monetary authorities to address BoP financing needs as well as other monetary policy purposes (International Monetary Fund, 2016, p.111). Reserves and related items consist of reserve assets (including gold), IMF credit and loans. Change in reserves constitutes the use of funds.

4.2. Variability of Method's Components

Depending on the sign of each variable included in the calculation method, variables that are considered to be sources of foreign exchange can become uses of foreign exchange and vice versa.

Consider an economy experiencing current account surplus. While current account deficit is regarded as the "use of funds" by the residual method, current account surplus represents an inflow of foreign exchange, and therefore it turns into a source of funds that can be offset by changes in three other variables. Note that variable "current account deficit" corresponds to "current account balance" entry in the BoP multiplied by (-1) so that a current account deficit has a "+" sign, and current account surplus has "-" sign[7]; therefore, current account is in surplus when $CA_t < 0$. Similarly, while additions to foreign exchange reserves are considered to be "uses of funds" in the original version of the method, negative change in the value of reserves and related assets constitutes a "source of funds" since it adds up to the volumes of foreign exchange in the economy.

World Bank Residual method considers sources of funds to be represented in the official flows that enter domestic economy, such as increase in the value of external debt and foreign direct investment. The underlying assumption of this method is that these sources of foreign exchange, if not covered by recorded uses of funds within the economy, are subject to capital flight. Therefore, in the situation when external debt is decreasing and FDI remains at a low level, World Bank Residual method is unlikely to record capital flight unless economy is experiencing large surplus on the current account and

[6] World Bank. *Reserves and related items (BoP, current US$)* [online] Available at: < https://data. worldbank.org/indicator/BN.RES.INCL.CD?locations=UA> [Accessed 10 May 2019]

[7] This modification was done to accommodate the signs of the variables in the original version of the method, where current account deficit variable is preceded with a "minus" sign to represent a use of foreign exchange.

foreign exchange reserves are decreasing. Mathematically speaking, if $CA_t < 0$ (surplus on the current account) and $\Delta RES_t < 0$ (reserves are diminishing), $\Delta DEBTADJ_t < 0$ (external debt stock is decreasing), $FDI_t > 0$, the formula of the residual method becomes:

$$KF_t = ((-\Delta DEBTADJ_t) + FDI_t) - (-CA_t) - (-\Delta RES_t)$$
$$KF_t = (CA_t + \Delta RES_t + FDI_t) - \Delta DEBTADJ_t$$

In this situation, capital flight will occur only if:

$$(CA_t + \Delta RES_t + FDI_t) > \Delta DEBTADJ_t$$

where $(CA_t + \Delta RES_t + FDI_t)$ are sources of funds and $\Delta DEBTADJ_t$ constitutes uses of funds. Similarly, in case country experiences a net FDI outflow ($FDI_t < 0$), then this variable becomes a "use of funds" in view of WBR method

4.3. Adjustments

Based on the approach of Ndikumana and Boyce (2001, 2010), we apply several important adjustments to the value of total external debt stock to account for the impact of exchange rate fluctuations, debt write-offs and capitalization of interest arrears (see Appendices). We also analyze the impact of migrant remittance flows on the value of capital flight, and consider whether we need to introduce adjustments to remittance volumes recorded on current account balance.

Adjustment for exchange rate fluctuations. Since country's external debt is denominated in different currencies, exchange rate fluctuations of dollar against other currencies have to be accounted for in the change of total external debt stock. World Bank International Debt Statistics report long-term debt stocks of public and publicly guaranteed debt in USD using end-of-year exchange rate (International Debt Statistics, 2016, p.161). When exchange rate of other currencies in which debt is denominated changes throughout the year, the number reflected in the final year-to-year value of the debt stock will differ from actual

debt flows during the year (Ndikumana and Boyce, 2001, p.35). These fluctuations have an effect on estimated magnitude of capital flight: if a currency depreciates against dollar, change in the debt stock will be lower, and consequently estimated volumes of capital flight value will be reduced; on the contrary, under appreciation, magnitude of capital flight will be inflated (Ibid). Accounting for exchange rate fluctuations is particularly important if considerable parts of country's external debt are denominated in currencies other than the US dollar.

Below we provide with analysis of the currency composition of Ukrainian external debt in 1994-2017. Pre-2001 Ukraine had a considerable portion of debt denominated in German marks (12.32% on average), while over a half of PPG debt was held in US dollars (56.54%). After 2001, share of USD increased to 68.51% on average, while Euro accounted for 12.82% of PPG debt. Between 2009-2017, SDR corresponded to nearly 20% of total PPG debt. The average share of other currencies in the total of PPG debt has been relatively small – Swiss francs have accounted for less than 1%, and Japanese Yen for 1.1-1.6% on average. Therefore, we expect that impact of exchange rate fluctuations would stem from variations of value of Deutsche mark between 1992-2000, Euro between 2001 and 2017 and SDR between 2009 and 2017.

Currency Composition of PPG debt: weighted averages, 1994-2000 (%)

	French franc	Deutsche mark	Japanese yen	Swiss franc	USD	Multiple currencies	Other currencies
Ukraine	0.4	12.32	1.55	0.01	56.54	21.15	0.13

Currency Composition of PPG debt: weighted averages, 2001-2008 (%)

	Euro	SDR	Japanese yen	Swiss franc	USD	Multiple currencies	Other currencies
Ukraine	18.14	0	2.07	1.76	66.69	11.35	~0.00

Currency Composition of PPG debt: weighted averages, 2009-2017 (%)

	Euro	SDR	Japanese yen	Swiss franc	USD	Multiple currencies	Other currencies
Ukraine	8.11	19.65	1.15	0	70.13	0.60	0.36

While we do not foresee significant changes to the value of total external debt resulting from exchange rate fluctuations, we nevertheless employ this adjustment, which is an important step to help us capture debt flows correctly and in line with previous research on capital flight. The methodology of how to mathematically compute the effect of exchange rate fluctuations is sourced from Ndikumana and Boyce (2001, 2010). Step-by-step computations are contained in Appendices.

Adjustments for debt write-offs. Another important adjustment to apply to the value of total external debt stock is accounting for debt write-offs (i.e. reported as "debt forgiveness or reduction" in IDS). Debt forgiveness is reflected in the reduction of total external debt stock (International Debt Statistics, 2016, p. 161). While nominally debt is reduced, there are no corresponding outflows of foreign exchange from the country – such that would normally take place under debt repayment. Therefore, we need to add the volumes of debt forgiveness or reduction to the total external debt stock to account for understatement of capital flows resulting from debt write-offs (Ndikumana and Boyce, 2010, p.473).

Adjustments for capitalization of interest arrears. According to the World Bank definition, interest arrears are interest payments due but not paid. Once interest payments are rescheduled, they become capitalized (International Debt Statistics, 2016, p. 163). Capitalization of interest arrears causes long-term debt to increase and consequently total external debt stock will rise as well, while there will be no corresponding inflows of foreign exchange. Therefore, in view of WBR method, no additional capital entered the economy as interest arrears were capitalized. It implies that if we were not to account for capitalization of interest arrears in the value of total change of external debt stock, capital flight would be

overestimated. Thus, we will subtract capitalization on interest arrears from the total value of external debt.

Migrant Remittances. Another factor, which might affect capital flight calculations, is migrant remittances. Official remittance flows are reflected in BoP statistics under personal transfers in secondary income account and compensation of employees in primary income account (International Monetary Fund, 2014). However, migrant transfers made through unofficial channels are much more difficult to estimate, though their proportion in total remittance flows might be significant. For instance, World Bank findings show that more than half of total remittance flows in Africa were unrecorded (World Bank, 2006, p. 92). Underestimation remittance volumes means that certain amount of foreign exchange that enters the country is not recorded anywhere, and as a result true magnitude of capital flight calculated by WBR method will be underestimated (Ndikumana and Boyce, 2010, p. 474). While World Bank data provides correction of remittance flows for some countries, Ukraine is not one of them – data presented by the World Bank is identical with remittance volumes reported in the official BoP statistics. At the same time while sometimes remittance flows enter the country through banks or other formal channels, large volumes are passing through informal channels, which are more difficult to estimate. Remittances have an important role in Ukraine's economy, especially as more and more Ukrainians are moving abroad both for long-term and permanent residence as well as seasonal work. Findings of the National Bank of Ukraine show that the proportion of remittance flows through official channels constitutes only half of total remittance flows on average in recent years (National Bank of Ukraine, 2018).

Remittances are accounted for as part of primary and secondary income in the current account balance (International Monetary Fund, p. 237). Since all transactions on current account are reflected in current account deficit included in WBR method, we have already accounted for remittances captured by BoP statistics in capital flight calculations.

The final version of formula used to calculate capital flight goes as follows:

$$KF_t = (\Delta DEBTADJ_t + FDI_t) - (CA_t + \Delta RES_t)$$

where $\Delta DEBTADJ_t$ is change in total external debt stock adjusted for exchange rate fluctuations in the value of PPG debt, debt write-offs and capitalization of interest arrears. According to the changes introduced by the new IMF sign convention in the Balance of Payments and International Investment Position Manual (BMP6), the sign of net FDI value was changed[8].

4.4. Scope of the Method

Sheets (1995) provides examples of different types of capital flight inherent to transition economies and demonstrates the scope of different measures to capture these flows. Below we analyze capabilities of the residual method to capture different forms of capital flight based on the scenarios provided by Sheets (1995, p.20-23).

Consider a situation when an exporting firm sells a product to the final consumer but does not repatriate the earnings. Instead, the firm buys a corporate bond in a foreign country, and most probably does not report its nationality to go around the laws compelling the firm to repatriate the earnings back to exporter's country of origin. This transaction will be reflected in the BoP as a current account surplus without offsetting decline in official reserves and commercial bank foreign currency holdings. Therefore, WBR method would capture this transaction as capital flight: current account surplus will be added to the calculations as a source of funds that does not have a corresponding use of funds within the domestic economy.

[8] According to the recording principles reflected in the Balance of Payments and International Investment Position Manual (BMP6), net foreign direct investment is calculated as a difference between liabilities and assets, and net inflow is represented with a minus sign. Therefore we change the sign of *FDI_t* to accommodate the signs of the variables in the original version of the method, where net foreign direct investment variable is preceded with a "plus" sign to represent a source of funds.

Another interesting scenario shows what happens if an individual trades domestic currency for dollars at a commercial bank, and then simply keeps dollars in cash at home. If the bank decides to exchange domestic currency for dollars at the Central Bank, this will cause foreign exchange reserves of the Central Bank to decrease. Therefore, WBR method in this case, will again reflect this transaction as capital flight, since decrease in reserves will not have an offsetting entry in the BoP. However, if commercial bank does not trade the domestic currency for dollars at the Central Bank, and instead decreases its foreign currency holdings at the foreign bank, this transaction will not be detected by the WBR method.

Another scenario when capital flight remains undetected is when a citizen smuggles money abroad and then invests them in a foreign asset without reporting her nationality. This transaction cannot be detected, since there are no records to prove that smuggling took place.

5. Results

In this section we present results produced by the WBR method calculating capital flight from Ukraine in 1994-2017. Results are contained in the table below.

Capital Flight from Ukraine in 1994-2017, USD billions

Year	CA	FDI	ΔRES	$\Delta DEBTADJ$	KF
1994	1.163	0.151	-1.2	1.716	1.903
1995	1.152	0.257	-1.624	2.555	3.284
1996	1.184	0.526	-0.603	1.25	1.195
1997	1.335	0.581	-0.703	1.858	1.807
1998	1.296	0.747	-3.457	1.766	4.674
1999	-1.658	0.489	-0.184	2.36	4.691
2000	-1.481	0.594	1.004	-1.692	-0.621
2001	-1.402	0.769	1.695	8.42	8.895
2002	-3.173	0.698	1.229	1.254	3.897
2003	-2.891	1.411	2.248	2.338	4.393
2004	-6.909	1.711	2.523	6.225	12.321
2005	-2.531	7.533	10.725	3.041	2.381
2006	1.617	5.737	2.409	19.197	20.908
2007	5.272	9.218	9.406	26.462	21.001
2008	12.763	9.903	-3.025	18.42	18.585
2009	1.732	4.654	-11.715	5.623	20.26
2010	3.018	5.759	5.045	19.29	16.986
2011	10.245	7.015	-2.454	12.62	11.844
2012	14.315	7.195	-4.174	-3.404	-6.35
2013	16.518	4.079	2.005	12.91	-1.534
2014	5.113	0.299	-13.308	-19.24	-10.746
2015	-1.565	3.012	0.793	-9.184	-5.399
2016	1.394	3.268	1.368	-2.157	-1.651
2017	2.088	2.194	2.56	-2.115	-4.569

With reference to the impact of adjustments to the original method, values of external debt, once adjusted for exchange rate fluctuations, did not differ significantly from the original debt volumes reported in International Debt Statistics, and there are several reasons for that. First of all, most of Ukraine's external debt throughout the years has been held in USD – 64% of all PPG debt on average. Second, between 1994 and 2017, currencies in which Ukrainian external debt was held did not experience significant fluctuations and therefore, changes in the value of external debt attributable to exchange rate weren't significant compared to the change resulting from additional borrowing and debt repayment. Finally, International Debt Statistics do not provide with currency composition of private non-guaranteed debt and short-term debt, which are two other main components of external debt.

According to the results produced by WBR method, capital flight from Ukraine was the highest between 2004 and 2011, with its peak in 2007. The average capital flight over the whole studied period amounted to 5.34 billion USD.

In 2007, capital flight reached 21 billion USD, while the largest increase in the external debt stock of 26.5 billion USD took place on a same year. This is also the case for the years 2006, 2008 and 2010, where high levels of capital flight were accompanied by large increases in the indebtedness levels. Relationship between increases in external debt and capital flight has been described in the literature. For instance, Khan and Ul Haque (1985) create a theoretical model, where they analyze individual investment behavior. Authors argue that under the presence of risks associated with investing domestically, uncertainty over future returns provides incentive to an agent to invest his domestic savings abroad, while at the same time use foreign borrowings to finance domestic investments. Another similar study was conducted by Ndikumana and Boyce (2001), who use the sample of 30 Sub-Saharan African countries to prove that foreign borrowing and capital flight are positively and significantly related. Moreover, Boyce (1992, p.338) argues that this relationship runs both ways, and both "flight-fueled" foreign borrowing and "debt-fueled" capital flight may be observed in indebted economies. When country's external debt is increasing, it is usually a sign of

worsening macroeconomic conditions that raise the likelihood of the debt crisis, and thus debt-fueled capital flight is caused by the same drivers that led the country to taking out more loans (Ibid). At the same time, an inflow of money through the foreign borrowing adds to the pool of funds that could be subject to capital flight, and while the government takes on loans, private individuals engage in capital exports (Ndikumana and Boyce, 2001, p.28). Flight-fueled foreign borrowing occurs in response to the need to supplement domestic resources, as capital flight diminishes the amount of funds available to finance domestic investment.

Another argument that could explain higher capital flight in the years with the largest increases in foreign debt is the role of government leaders in embezzlement of borrowed money (Ndikumana and Boyce, 2001, p. 109). This phenomenon has been described by Ndikumana and Boyce on the example of Mobutu regime in Congo (1998), and Boyce (1992, 1993), who studied the case of Philippines under the rule of Ferdinand Marcos.

Our results show that except 2006 and 2007 capital flight from Ukraine was the highest in the period of global financial crisis, when country's growth levels fell by 15% in 2009, leading to economic stagnation that lasted till 2013 with an average annual growth of -0.7% (World Bank, 2017, p.5). We also observe higher capital flight in 1998-1999 compared to preceding years. This coincided with Asian financial crisis and related crisis in Ukraine, fueled by the emission of T-bills used to finance budget deficit. In those years, Ukrainian economy contracted and domestic currency lost 60% of its value (Petryk, 2006, p.10-11)

Our results are in line with the estimates reported in the literature on capital flight from Ukraine, where the World Bank Residual method was used. Brada et al. (2011) estimate 4.01 billion of average capital flight from Ukraine over 1995-2005, compared to an average of 4.27 billion produced by our estimates, calculated over the same period. In the study Global Financial Integrity in 2008, Kar and Cartwright-Smith report 8.5 billion USD in capital flight from Ukraine on average over 2002-2006, while our estimates for the same period show capital flight amounting to an average of 8.78 billion USD. Again, our

results over 1995-2005 and 2002-2006 are in line with capital flight volumes estimated in the previous research.

For the period not covered in the previous calculations of capital flight from Ukraine, we obtained surprising results: in 2012-2017 the value of residual calculated as a difference between sources and uses of funds is negative, and in view of WBR method, it represents an **unrecorded capital inflow,** or **reverse capital flight**. Capital inflow in 2014 amounted to 10.7 billion USD, while the following years were also characterized by unrecorded capital inflows in the amount of 3.9 billion on average over 2015-2017. According to our results, reverse capital flight took place in times of a major economic crisis in Ukraine, when GDP dropped by 6.8% and inflation rose to 24.9% by the end of 2014, and due to sharp currency devaluation external debt amounted to 97.6% of GDP (World Bank, 2015). Ukrainian Hryvnia lost 47% of its value in 2014 and depreciated by further 33% in 2015 (World Bank, 2017, p.4), In addition, 2014 was marked heightened political instability and threats to the national security, as a military conflict in the east of Ukraine began in April 2014.

6. Discussion

With regard to what we assumed are the determinants of capital flight in Ukraine, we expected to observe significantly larger volumes of unrecorded capital outflows in 2013-2015. Based on the theory of demand for domestic assets (Sheets, 1995), increased political instability and worsening of macroeconomic indicators reduce risk adjusted expected return, and therefore cause lower demand for domestic assets. Indeed, we have seen a detrimental drop in foreign direct investment inflows to Ukraine by 3.7 billion USD, which is in line with the above assumption. However, cross-border investments constitute recorded capital outflows, while the World Bank Residual method aspires to capture unrecorded capital flight. Moreover, snap presidential elections in Ukraine in 2014, and appointment of new political leaders increased political risks, creating a level of uncertainty over future policies of the new government. Therefore, given economic and political situation in Ukraine in 2014-2017, capital inflow is an unexpected phenomenon to observe.

6.1. Negative Value of the Residual

In this section we examine components of the World Bank Residual method and analyze changes in the value of the variables in 2013-2015 to understand why calculated results report negative value of the residual. The latter is calculated as a difference between sources and uses of funds, while negative value of the residual signifies that uses of funds exceeded the sources. In 2014, sources of funds were represented by the use of foreign exchange reserves and foreign direct investment inflows[9]. The shortage of "sources of funds" resulted from the negative value of change of total external debt stocks, which decreased by 19 billion USD. Significant decline in volumes total external debt in 2014 resulted from 10 billion USD decrease in the value of private-non-guaranteed debt as well as 12 billion USD decrease of the short-term debt (International Debt Statistics). In the following years, PNG debt and short-term debt continued to

[9] Refer to section 4.2 for detailed explanation of sources and uses of funds in view of WBR method.

decrease. As stated in the annual report of the National Bank of Ukraine (2014), fall in the value of total external debt is in part due to private sector debt repayment. Given low level of FDI over 2013-2017 and persistent current account deficit (except 2015), calculated results suggest that between 2014 and 2017 uses of funds exceeded sources of funds, indicating an unrecorded capital inflow.

In the situation when total external debt stock is decreasing, the only way for the residual method to record capital flight is when county is experiencing current account surplus and/or decreases its foreign exchange reserves and/or receives high net FDI, in the amount sufficient to offset “the use of funds” represented by the decrease of total external debt stock. In 2014, when total external debt stock started to decrease by as much as 19.2 billion USD, current account deficit amounted to 5.1 billion USD and with net FDI dropping to 299 million USD, the only other source of foreign exchange in the economy which came from the use of reserves in the amount of 13.3 billion USD, was not sufficient to offset the decrease in the external debt stock and cover the deficit on the current account. Therefore, since uses of funds exceeded the sources of funds by 10.7 billion USD, calculated results reported negative value of residual, which signifies unrecorded capital inflow.

Prior to 2014, negative value of the residual was recorded in the year 2000, 2012 and 2013, and with exception of 2013, these years were also characterized by decreases in foreign external debt stock. We have discussed earlier how foreign borrowing might lead to higher capital flight; therefore, the question is - does this relationship work in reverse, i.e. does fall in the external debt stock cause lower capital flight? In the years preceding the war, buildup of the external debt was the main “source of funds” in view of WBR method, since net FDI remained on a low level (3.4 billion USD on average pre-2014). In 2014, the need of debt repayment cut off the flow of foreign exchange that could have been used for capital flight[10]. This hypothesis is related to the notion of debt-fueled capital flight, introduced by Boyce (1992), where he argues that funds acquired through foreign borrowing add to the pool of resources that can be subject to capital flight. Assuming that this relationship works in reverse, debt

[10] It is important to note that while debt repayment constitutes capital outflow, it is not regarded as capital fight in view of definitions presented in this thesis (see section 3.1).

repayment flows diminished volumes of foreign exchange in the economy overall – particularly in 2014, when external debt stock decreased by more than 19 billion USD. While debt-fueled capital flight cannot be observed under significant debt repayment flows, this does not mean however that capital flight did not take place through other channels.

6.2. Gaps in the World Bank Residual Method

Recorded capital outflows intensified with the start of the military conflict in 2014 and were reflected in surging levels of foreign direct investment and debt repayment outflows. Unrecorded capital flows - i.e. capital flight that WBR method aspires to estimate – were an expected outcome resulting from political instability and economic crisis. While calculated results show unrecorded capital inflow, it could be also the case that capital flight has taken forms that WBR method doesn't encompass.

Trade misinvoicing. As mentioned earlier, trade misinvoicing is not captured by the WBR method since all trade transactions are part of current account balance variable, while trade misinvoicing can mask larger current account deficit – or surplus (Eggerstedt et al., 1995, p.215). Indeed, previous research shows that trade misinvoicing is accountable for considerable volumes of capital outflows from Ukraine (Serebryabksy and Vdovychenko, 2012). Also, according to the findings of the report published by Global Financial Integrity (2014), where authors estimated Illicit Financial Flows from developing countries in 2003-2012, it is reported that trade misinvoicing accounts for 77.8 % of total Illicit Financial Flows in developing countries over 10 years period.

Shadow economy. As discussed earlier, the World Bank residual method considers sources of funds to be represented in official flows that enter domestic economy, such as increase in the value of external debt and foreign direct investment. The underlying assumption of this method is that these sources of foreign exchange, if not covered by recorded uses of funds within the economy,

are subject to capital flight. On the contrary, in times of shortage of the official sources of foreign exchange, method reports capital inflow.

In countries like Ukraine, where shadow economy constitutes 45% of total amount of goods and services produced in the country (Medina and Schneider, 2018), sources of funds go beyond official inflows of foreign exchange. It is possible that some of the funds generated in the shadow economy were channeled into covering official uses of funds such as current account deficit, or debt repayment flows by the private sector. Moreover, from the capital flight perspective, when earnings generated in the shadow economy are leaving country's borders, they won't be reflected in the official statistics, since no one ever reported ownership of these funds in the first place. In addition, since capital flight investors are looking to hide the origin of illegally earned money, they are likely to engage in illicit cross-border transfers of money or goods, including trade misinvoicing, smuggling or hawala transactions. As Erbe (1985, p.269) points out, illegal practices result in Balance of Payments statistics not being able to reflect the full of extent of economy's foreign currency receipts or capital outflows.

6.3. Reverse Capital Flight

In this section we propose several hypotheses that could partially explain unrecorded capital inflows to Ukraine in 2014-2017 suggested by our results. We assume that the following factors could have potentially had an impact on reverse capital flight: capital inflows for the purposes of financing transactions in the underground economy, increase in migrant remittance flows and higher demand for foreign currency on the black markets.

We start with referring to the literature where phenomenon of reverse capital flight was studied. The important feature of unrecorded capital inflows stressed by economists (Kar and Freitas, 2013; Kar, 2012; Mahmood, 2013) is that unlike legal capital flows, which represent capital gain for the domestic economy and are recorded in the official statistics, capital flight reversal is unrecorded and hence it does not constitute taxable income and cannot be used to finance economic development. Kar and Freitas (2013, p.4) argue that not only unrecorded capital inflows are often driven by illicit activities; they are also used

in illegal transactions that underline country's shadow economy, exacerbating the scale of corruption and black market operations. Similarly, Mahmood (2013, p.2), who studies the phenomenon of reverse capital flight on the example of Pakistan, argues that reverse capital flight serves as a way of "*whitening the black money that earlier flew from the country*". Funds that enter the country escaping official statistics end up in the shadow economy, where the perpetrators evade taxes and any control of local authorities. Therefore, capital flight owners are likely to benefit the most from the unrecorded inflows of foreign exchange, which give them an opportunity to continue generating illicit incomes in country's shadow economy.

Below we provide with several hypotheses for reverse capital flight pertaining to the features of Ukraine's economy in 2014-2017.

Appearance of new niches in the shadow economy. Ministry of Economic Development and Trade of Ukraine (2019) underlines that presence of territories that are outside of government control is one of the main obstacles in an attempt to decrease the share of the shadow economy in Ukraine. Since the beginning of war in the east of Ukraine in 2014 and expropriation of local enterprises by separatist leaders, official transfers of goods and services between occupied and non-occupied territories became largely complicated (The Independent Defense Anti-Corruption Committee, 2017). In addition, due to the economic blockade of the occupied territories of Donetsk and Luhansk regions in early 2017 (Presidential Decree from 15 March 2017), commercial transactions that became outlawed in the legal sector, moved to the underground part of the economy. Channels and scope of illegal trade with occupied territories were described in the report by The Independent Defense Anti-Corruption Committee (2017). Therefore, it might be the case that political instability and government-led military operation in the east of Ukraine created new niches in the shadow economy where some capital owners found an opportunity to seek profit, while at the same time they required higher capital inflows to pay for the costs associated with these transactions. Thus it can be assumed that capital owners engaged in capital flight reversal to finance illegal transactions within Ukraine.

Remittance flows. As Mahmood (2013, p.2) points out, reverse capital flight might be channeled through the inflow of migrant remittances. As mentioned earlier, findings of the National Bank of Ukraine show that proportion of remittance flows through official channels constitutes only half of total remittance flows in recent years (National Bank of Ukraine, 2018). This is due to the increase in the number of Ukrainians working abroad, and particularly in Poland, after 2014, and the seasonal nature of their work, where migrants decide to bring their earnings in cash instead of transferring the funds through official channels. In order to capture part of the transactions passing through unofficial channels, National Bank of Ukraine recalculated volumes of remittances by using mirror statistics of the main countries of migrant destinations – Poland and Russia - and corrected corresponding entries in the Balance of Payments accordingly. These corrections were reflected in the data used to estimate capital flight with the World Bank Residual method[11]. However, it is possible that comparison of official statistics wasn't sufficient to capture the full extent of remittance inflows, especially given the fact that considerable number of Ukrainian migrants abroad work without a regular work contract and thus their actual compensation isn't recorded (Piontkivska et al., 2018). One of the reasons for higher migration levels was the introduction of visa-free travel between Ukraine and the European Union, which made it easier to travel and work abroad (Ibid). In addition, due to the restrictions on foreign currency transactions introduced by the National Bank of Ukraine in 2014, all of the remittance funds received from abroad through official channels, had to be exchanged for Ukrainian Hryvnia (Antonenko and Kashko, 2015, p.10). In times of high inflation and depreciation expectations following a sharp decline in value of Ukrainian currency in 2014-2015, Ukrainians residing abroad had a greater incentive to send their money home through informal channels in cash. Therefore, actual remittance flows after 2014 might have significantly exceeded reported volumes of remittances in BoP. Consequently, it

[11] Official remittance flows are reflected in BoP statistics under personal transfers in secondary income account and compensation of employees in primary income account, which are part of the current account balance. Therefore, remittance flows were captured by WBR method through CA_t variable.

can be argued that these unrecorded remittance inflows could partially explain reverse capital flight produced in our calculated results.

Black market. Another important factor that supports the argument of unrecorded capital inflows is reported growth of black currency market in Ukraine in 2014-2015. Economists of the Center of Economic Strategy[12] studied the changes in demand for foreign currency, and in particular US dollar, to estimate the amount of currency escaping official statistics (Zholud and Piontkivska, 2016). According to the official data published by the National Bank of Ukraine, in 2013 residents were buying around 1.7 billion USD monthly, while in 2014 demand dropped to 669 million USD, and in 2015 - to 57 million USD monthly, which means that demand for the US dollars in 2015 was 30 times lower, compared to 2013 levels (Ibid, p.4). These changes were the result of restrictions on currency exchange transactions and capital controls, introduced by the National Bank of Ukraine in 2014, with the goal of preventing large capital outflows and stabilizing the exchange rate (Antonenko and Kashko, 2015). Given high levels of dollarization of Ukrainian economy throughout the years and tendency of the population to increase their dollar savings in times of crisis, it is surprising to observe a decrease in demand for the US dollar by as much as 30 times between 2013-2015 – years marked with economic recession and large depreciation of national currency (Zholud and Piontkivska, 2016, p.4). Therefore, authors assume that where demand couldn't be met at the official markets, residents and businesses turned to black currency markets.

Zholud and Piontkivska (2016, p.4) support their hypothesis of demand for US dollars being higher than the numbers reported in the official statistics with empirical evidence, and namely increase in the number of branches of non-bank financial institutions, who are the main players on the official currency exchange markets. The number of branches increased by 70% in 2015, while according to the official statistics the volume of currency operations decreased by 79% in the same year (Ibid). Therefore, it is assumed that due to the policy of the National

[12] Centre for Economic Strategy (CES) is an independent economic policy think tank based in Kyiv, Ukraine. Website: https://ces.org.ua/en/about/

Bank of Ukraine restricting foreign currency transactions, some businesses and the population had to satisfy their demand for currency on the black market. Authors created the model, which shows increase of demand for cash money by minimum of 3.7 and maximum of 7.3 billion USD in 2014-2015 (Ibid, p. 13). This value was then used as a proxy to estimate the increase of the volume of US dollars on the black market. Consequently, estimated demand for currency in 2014-2015 was equal to 1.2 billion USD - compared to official statistics reporting 60 million USD demand. That means that unofficial market was larger than official market by 18 times (Ibid, p.14).

Increased demand for the US dollar on the black market had to be met by higher levels of currency supply. Therefore it is important to understand how the supply of foreign currency on the black market is created. Zholud and Piontkivska (2016, p.6) list the following agents who they believe are the main suppliers of US dollars to the domestic economy: exporters engaging in reversal of funds gained through export underinvoicing, illegal and unofficial exporters, remittance flows and residents holding their dollar savings in cash. Unofficial exporters are usually private individuals who conduct illegal export of goods such as amber, cigarettes, timber, etc. Over the past several years, illegal extraction and export of amber became very common due to the growing demand for the stone on the global markets; the proceeds of these transactions amount to over 300 million USD yearly (State Border Guard Service of Ukraine, 2016). According to the representative of Japan Tobacco International in Ukraine, costs of cigarette smuggling to the EU countries amount to over 95 million USD in budget losses yearly, generating 280 million USD income for the shadow economy (Chikotskas, 2018). Experts underline that smuggling volumes could grow due to introduction of visa-free travel from Ukraine in 2017 (KPMG, 2017). Ukraine is the largest exporter of wood to the EU, with exports exceeding 1 billion USD in 2017, while investigation of the Earthsight[13] (2018) reveals that at least 40% of this wood was harvested or traded illegally.

[13] Earthside is a UK-based non-profit organization investigating issues related to human rights an environmental justice. Website: https://www.earthsight.org.uk/

Zholud and Piontkivska (2016) find that in 2014-2015, the share of black market grew by minimum of 3.7 and maximum of 7.3 billion USD, while reverse capital flight amounted to 8.07 billion USD on average in the same time period. Therefore, if their findings are correct, then reverse capital flight can be partially explained by the need to meet growing demand for foreign currency in domestic black markets.

7. Conclusion

In this thesis, we estimated volumes of capital flight from Ukraine in 1994-2017 by using the World Bank Residual method. Capital flight is defined as net unrecorded capital outflows, and the estimation is based on the data presented in the Balance of Payments Statistics and International Debt Statistics assembled by the World Bank. In view of the World Bank Residual method, capital flight is identified with the positive value of the residual, calculated as the difference between sources and uses of funds in the domestic economy. Negative value of the residual signalizes unrecorded capital inflow.

Our findings show that pre-2014, capital flight amounted to 7.5 billion USD on average, and both Asian financial crisis of 1998-1999 and global financial crisis of 2008 had an effect on higher volumes of unrecorded capital outflows from Ukraine. We also notice that years marked with the highest levels of capital flight coincide with the times when largest increases in total external debt stock took place. Therefore, we find support for the relationship between foreign borrowing and capital flight, which was described in the literature (Boyce, 1992; Khan and Ul Haque, 1985).

Results produced by the World Bank Residual method show the surprising change of dynamics of unrecorded capital flows in 2014. This year was marked with the beginning of the military conflict in the east of Ukraine, increased political instability and deep economic recession. As investors withdrew their funds from the domestic economy, causing 3.2 billion USD decrease in foreign direct investment, our results show a simultaneous unrecorded capital inflow in the amount of 10.7 billion USD in 2014 and continuous inflows over 2015-2017 of 3.9 billion on average. We analyze the factors that might have caused reverse capital flight, and consider that increased remittance flows, growth of the black currency market and transactions of the underground economy might have had an effect on causing unrecorded capital inflows. Moreover, we recognize the existence of gaps in the World Bank Residual method used for computing capital flight, including volumes of trade misinvoicing, which were not accounted for in our calculations. Finally, we take account of the impact of illegal transactions in

the domestic economy on the data presented in the Balance of Payments, which might not correctly reflect the sources and uses of funds that are at the base of our calculations.

The ambiguity of results produced by our method is the reflection of the challenge it is to capture a very complex reality of a developing economy in the framework of the economic model. A one-country study made it possible to analyze conditions of the domestic economy and impact of political developments in the country on estimated capital flows. We found that for a country like Ukraine, where the share of the shadow economy is as high as 45% of the GDP, large volumes of domestic and external transactions escape official statistics. At the same time, high levels of corruption and illegal activities, which underline both underground and official economies, can serve as important drivers of both outward and reverse capital flight. Therefore, though our results show unrecorded capital inflows in 2014, we cannot disregard that there is a high probability of outward capital flight taking forms that method's calculations didn't encompass. While it is possible that reverse capital flight took place in response to the factors described earlier, deterioration of Ukraine's economy and heightened political instability combined with security risks stemming from the military conflict on country's territory arguably caused movements of capital outside of country's borders, which were neither reflected in the official statistic, nor were they detected by our method's calculations. Therefore, we come to the conclusion that this particular method of capital flight estimation cannot capture the full extent of capital transactions from within and without the domestic economy, since the volumes of sources and uses of funds are distorted by the presence of shadow economy.

We believe that accounting for volumes of trade misinvoicing in capital flight calculations could help better capture the volumes of unrecorded financial flows. Current version of Trade Misinvoicing method is criticized due to the assumption of the fixed value of CIF/FOB ratio for all countries and all goods, as well as impossibility to separate trade misinvoicing from other factors that cause discrepancies in mirror trade statistics. In the future, IMF DOTS statistics plan to include OECD-estimated time varying and country specific values of CIF and

FOB, which will help to estimate discrepancies in the mirror statistic more accurately.

In Ukraine, success of anti-corruption reforms and the end of military conflict will have a positive impact on the general state of the economy, bringing higher level of transparency of business transactions and curbing illicit income-generating schemes underlying country's shadow economy. Structural reforms and stabilization of the value of Ukrainian Hryvnia will positively affect the investment climate in the country, which will help attract the foreign capital that Ukraine desperately needs. At the same time, what is most important is that the proceeds of higher investment flows and foreign borrowing entering the economy are not misused for the enrichment of the few, but instead are channeled into productive activities and reforms, with the goal of bringing the economic growth and development that the people of Ukraine have been waiting sine 1991.

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Appendices

Adjustments for Exchange Rates Fluctuations

Based on the approach of Ndikumana and Boyce (2001, 2010), we adjust the value of total external debt stock to account for the impact of exchange rate fluctuations. Mathematical formulas and reasoning for this adjustment is extracted from Ndikumana and Boyce (2001, p.35-38).

Using data on currency composition of public and publicly guaranteed debt (PPG), reported by World Bank's International Debt Statistics, we account for exchange rate movements in the current year in variation of the total debt stock. This adjustment can be done by calculating the difference between beginning-of-year debt stock calculated at end-of-year exchange rates and beginning-of-year stock calculated at beginning-of-year exchange rates. We understand that when Ndikumana and Boyce (2001, 2010) use the term "beginning-of-year debt stock", it is considered to be a value of debt carried over from previous year to current year. The latter is approximately equal to the value of change in total external debt stocks reported at the end of previous year; same logic applies to exchange rates. The goal of this adjustment is to estimate how much of the change in value of debt is attributable to exchange rate fluctuations in the current year. We do so by calculating $NEWDEBT_{t-1}$, which is the value of end-of-previous-year debt (assumed to be equal to the debt stock at the very beginning of the current year) calculated at the end-of-current-year exchange rates. This adjustment is applied only to debt held in non-USD currencies, while debt held in multiple currencies and unspecified currencies as well as short-term debt and private non-guaranteed debt are left unadjusted.

Formula of calculating the beginning-of-year change in total debt stock goes as follows:

$$NEWDEBT_{t-1} = \sum_{j=1}^{6} \left(\alpha_{j,t-1} * PPGDEBT_{t-1}\right) / \left(\frac{EX_{jt}}{EX_{j,t-1}}\right) + \frac{IMFCR_{t-1}}{\left(\frac{EX_{SDR,t}}{EX_{SDR,t-1}}\right)} + PPGOTHER_{t-1}$$
$$+ PPGMULT_{t-1} + PPGUSD_{t-1} + PNG_{t-1} + STDEBT_{t-1} + \epsilon_{t-1}$$

where $PPGDEBT$ is the total public and publicly guaranteed debt; $\alpha_{j,t-1}$ is the proportion of PPG debt held in currency j , for each of the six non-US currencies in which Ukraine's external debt is held[14]; time indexes t refers to the end of year while $t-1$ to the end of previous year; EX is the end-of-year exchange rate of the currency of denomination against the dollar (expressed as units of currency per US dollar); $IMFCR$ is the use of IMF credit; $PPGOTHER$ is long-term debt denominated in other unspecified currencies; $PPGMULT$ is long-term debt denominated in multiple currencies; $PPGUSD$ is long-term debt denominated in US dollars; PNG is private non-guaranteed debt; $STDEBT$ is short-term debt; $DEBT$ is the total debt stock reported by the World Bank; and ϵ_{t-1} is the calculated discrepancies between the values of PPG debt resulting from poor quality of the data.

We then calculate the difference between $NEWDEBT_{t-1}$ and $DEBT_{t-1}$, where the latter is the value of end-of-previous-year debt stock calculated at the end-of-previous-year exchange rates. The number obtained is called "exchange rate adjustment" which shows the difference between the stock of debt valued at the end of year exchange rates and debt valued at the end of previous year exchange rates, which shows how much of a change in the debt stock is attributable to exchange rate movements in the current year.

$$ERADJ_t = NEWDEBT_{t-1} - DEBT_{t-1}$$

We subtract the exchange rate adjustment from the value of total external debt at the end of the year to obtain $\Delta DEBTADJ$, which shows the change of debt stock attributable to the change in borrowing the period and not currency variation effects.

[14] The six currencies are the Euro (from 2001), French franc and the Deutsche mark (until 2001), Swiss franc, Yen and SDR.

$$\Delta DEBTADJ_t = \Delta DEBT_t - ERADJ_t$$

Since $\Delta DEBT_t = DEBT_t - DEBT_{t-1}$ it follows that last equation is equivalent to:

$$\Delta DEBTADJ_t = DEBT_t - NEWDEBT_{t-1}$$